

Species Diversity, 2006, 11, 77–92

## ***Cephaloscyllium parvum* (Chondrichthyes: Carcharhini- formes: Scyliorhinidae), a New Swell Shark from the South China Sea**

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(Received 24 September 2005; Accepted 22 February 2006)

A new swell shark, *Cephaloscyllium parvum* n. sp., is described based on specimens from the South China Sea. It is a dwarf species and can be distinguished easily from large species of the genus by size at maturity. The new species is distinguishable from the other two dwarf species of the genus by possession of a triangular anterior nasal flap, a long preoral snout, fewer vertebrae, narrow mouth, and small head.

**Key Words:** *Cephaloscyllium parvum* n. sp., Scyliorhinidae, dwarf swell shark, South China Sea.

### **Introduction**

Sharks of the genus *Cephaloscyllium* Gill, 1862 inhabit continental and oceanic insular waters of the temperate to tropical Indo-Pacific. They are called “swell sharks” or “balloon sharks” because they swallow seawater to fill their stomach and inflate their abdomen to threaten their enemies or to anchor their body among rocks. In addition to this unique habit, this genus is further well defined by the presence of a supraorbital crest on the cranium, a second dorsal fin that is considerably smaller than the first dorsal fin, and the absence of labial furrows in both jaws (Springer 1979; Compagno 1984, 1999).

The taxonomy of this genus is confusing, partly on account of the presence of various undescribed and/or unnamed species. Nakaya (1975) counted eight valid species in the genus. Compagno (1984) recognized seven species, with a suggestion of one undescribed species from the western North Pacific. Last and Stevens (1994) reported two species and also five unnamed species (spp. A–E) from Australia. Compagno (1999) recognized seven species and also suggested the possible existence of nine more undescribed species. Recently Compagno *et al.* (2005a) recognized seven species and six undescribed species, and Compagno *et al.* (2005b) reported the presence of one more undescribed species from the Philippines. Considering these circumstances, a thorough world revision is absolutely necessary to settle the taxonomy of the genus *Cephaloscyllium*.

Despite this unresolved taxonomic confusion, the second author (KN) had be-

come aware of an undescribed species of *Cephaloscyllium* from the South China Sea, which was preliminarily reported by Inoue and Nakaya (2002), and here we describe it as a new species.

### Materials and Methods

Methods of measurements and terminology follow Compagno (1984). Sexual maturity stages follow Nakaya and Stehmann (1998), but the developmental condition of the testis was added for appraising the maturity stages of males. Maturity stages of males and females are defined as below.

Maturity stage 1 (immature): male—clasper and testis very small and completely undeveloped; female—ovary and shell gland completely undeveloped.

Maturity stage 2 (adolescent): male—clasper elongate, but soft and not fully calcified, testis developing; female—ovary without ripe eggs but shell gland developing.

Maturity stage 3 (mature): male—clasper long, hard and calcified, testis completely developed; female—ovary completely developed, with at least one large ripe egg.

Total length and head length are abbreviated as TL and HL, respectively. Institutional acronyms are those of Leviton *et al.* (1985), except for TMFE (Faculty of Marine Science and Technology, Tokai University, Japan).

### *Cephaloscyllium parvum* n. sp.

(Figs 1–5, 6A, 7–9)

*Cephaloscyllium umbratile* (not Jordan and Fowler, 1903): Teng 1962: 45, fig. 10 (Taiwan); Chen 1963: 29, fig. 9 (Taiwan); Chan 1966: 229, fig. 5, 7 (b, d), pl. 2 (South China Sea); Bessednov 1969: 27, figs. 9, 10 (Gulf of Tonkin).

*Cephaloscyllium sufflans* (not Regan, 1921): Fourmanoir and Nhu-Nhung 1965: 13, fig. 1 (Vietnam).

*Cephaloscyllium formosanum* (not Teng, 1962): Shen 1984: 2, pl. 2 (4-4 a, b) (Taiwan).

*Cephaloscyllium isabellum* (in part as pseudo-*umbratile*): Compagno 1984: 298 (China).

*Cephaloscyllium* sp.: Compagno 1988: 115 (China); Compagno *et al.* 2005a: 222, pl. 36 (China).

**Material examined.** Holotype: HUMZ 109126, male, 397 mm TL, off Sarawak, Borneo Island, Malaysia, date unknown. Paratypes (4 specimens): HUMZ 109124, 109125, 109127, 1 male, 2 females, 349–406 mm TL, off Sarawak, Borneo Island, Malaysia, date unknown; HUMZ 170770, male, 166 mm TL, off Kaohsiung, southwestern Taiwan, date unknown. Non-type specimens (12 specimens): HUMZ 114179, 114180, 114181, TFRI 3080, 3359, THUP 616, 3 males, 3 females, 142–441 mm TL, off Kaohsiung, southwestern Taiwan, date unknown; THUP 1666, 2211, 2537, 2538, ASIZP 53881, 3 males, 2 females, 173–334 mm TL, off Tungkang, southwestern Taiwan, date unknown; FAKU 100088, female, 378 mm TL, Gulf of Tonkin, southern China, date unknown.

**Diagnosis.** Anterior nasal flap triangular, not reaching mouth. Adults with several saddle blotches and some lateral blotches. Young with many polka dots, in addition to blotches. Preoral length more than 2 times internarial space. Size at maturity less than 377 mm TL in male and female. Number of monospondylous vertebrae 37–41, precaudal vertebrae 68–71.

**Description.** The description of the holotype is given, with accounts of the paratypes added in the parentheses only when different from the holotype. Counts and proportional measurements are given in Table 1.

Body slender. Head large and well depressed; its length 4.7 (4.7–5.1) in TL. Tail slightly compressed. Caudal peduncle without a pit and keel. Caudal axis a little elevated.

Snout long and its tip slightly pointed; its length 3.6 (3.3–3.6) in HL, about equal to intergill length; preoral length 3.7 (3.8–4.2) in HL, 2.7 (2.2–2.7) times internarial space. Nostril near mouth; its width 2.8 (2.8–3.3) in mouth width. Anterior nasal flap well developed, triangular with no notch at inner margin, not reaching mouth. Posterior nasal flap well developed. Internarial space narrow, 4.4 (3.8–4.8) in mouth width, shorter than nostril width. Mouth very wide, its width about equal to pectoral base length; anterior tip of lower jaw rounded, level with anterior end of eye. Labial furrows completely absent from both jaws. Eye slender in horizontal direction; horizontal diameter greater than mouth length. Spiracle small, behind and slightly below eye. Gill openings short; height of first to fourth openings same, fifth opening smallest; fourth and fifth openings on base of pectoral fin.

Pectoral fin moderate in size; its base length about equal to interdorsal space; height 0.9 (1.0–1.3) in its base length; apex and free rear tip moderately rounded; anterior margin long and slightly convex; posterior margin linear (well convex in young). First dorsal fin located at about center of body; its origin above anterior 1/3 of pelvic fin base; base length greater than 2nd dorsal fin base length; height 1.6 (1.4–1.7) in its base length; apex and its free rear tip rounded; anterior margin long and slightly convex; posterior margin linear or slightly concave (well convex in young). Second dorsal fin considerably smaller than first dorsal fin; its origin above anterior 1/3 of anal fin base; base length 1.5 (1.4–1.5) in anal fin base length; height 1.9 (1.7–2.3) in its base length; apex well rounded and free rear tip slightly pointed; anterior margin long and slightly convex; posterior margin linear or slightly concave (well rounded in young). Pelvic fin located at about center of body; its insertion below posterior 1/3 of first dorsal fin base; base length 1.1 (0.9–1.2) in first dorsal fin base length; apex broadly rounded; free rear tip bluntly pointed (slightly rounded in young); inner margin linear. Anal fin larger than second dorsal fin; its origin below posterior 1/3 of interdorsal space; insertion level with second dorsal fin insertion; base length longer than interspace between anal fin and lower caudal fin; height 2.1 (1.9–2.5) in its base length; apex well rounded and free rear tip pointed; anterior margin long and convex; posterior margin linear or slightly concave (well convex in young); inner margin linear. Caudal fin with moderately developed lower lobe and distinct subterminal notch, without enlarged dermal denticles on its dorsal and preterminal margins; terminal and subterminal margins linear or slightly convex (well rounded in young); dorsal margin length 4.4 (3.8–4.5) in TL.

Number of rows of upper jaw teeth 64 (63–68), lower jaw teeth 62 (60–63). All teeth with 3 (infrequently 4) cusps, consisting of largest principal cusp and 1 or 2

Table 1. Proportional measurements (%TL) and counts of *Cephaloscyllium parvum* n. sp.

	Holotype		Paratypes				Range (mean) for all specimens	
	109126 Male 397 mm	170770 Male 166 mm	109127 Male 349 mm	109125 Female 377 mm	109124 Female 406 mm		Male (n=9) 142-397 mm	Female (n=8) 173-441 mm
Catalogue number (HUMZ)								
Sex								
TL								
Snout tip to:								
eye	6.0	6.0	6.2	5.6	5.8		5.7-6.2 (5.9)	5.0-6.0 (5.5)
spiracle	10.4	9.1	10.7	8.3	9.1		8.8-10.7 (9.7)	6.6-9.6 (8.7)
1st gill slit	16.5	14.8	14.9	14.0	15.0		12.9-16.5 (14.7)	13.6-15.0 (14.5)
5th gill slit	21.3	19.9	21.2	19.6	20.7		17.6-21.5 (19.9)	18.9-20.8 (20.1)
anterior nostril	3.7	3.3	3.7	3.1	3.2		2.6-3.7 (3.3)	2.6-3.4 (3.0)
mouth	5.7	5.0	5.4	4.7	5.4		4.5-5.7 (5.1)	4.4-5.4 (4.9)
1st dorsal fin origin	49.5	43.1	47.9	46.2	47.2		41.3-50.7 (45.9)	43.7-48.8 (46.4)
2nd dorsal fin origin	65.8	57.9	65.8	64.8	64.6		56.5-65.9 (62.0)	58.1-65.0 (62.8)
pectoral fin origin	21.3	16.6	20.3	18.4	19.5		16.1-21.3 (18.0)	72.6-77.9 (75.0)
pelvic fin origin	45.1	40.9	45.0	44.9	41.0		38.0-45.1 (42.2)	40.8-45.2 (43.6)
anal fin origin	62.3	55.5	63.2	60.7	61.3		52.0-63.2 (58.7)	54.3-62.9 (59.5)
upper caudal fin origin	75.7	71.2	78.0	77.5	77.9		69.4-78.0 (74.0)	72.6-77.9 (75.0)
lower caudal fin origin	74.9	68.0	76.5	74.8	76.2		68.0-76.5 (72.8)	68.4-76.2 (73.3)
Interspace between:								
1st and 2nd dorsal fins	9.1	8.6	9.7	9.1	9.5		8.5-10.2 (9.0)	7.7-9.5 (8.7)
2nd dorsal and upper caudal fins	7.4	4.9	6.8	7.6	10.7		4.9-7.4 (5.7)	6.1-10.7 (7.7)
pectoral and pelvic fins	18.6	13.3	20.2	19.0	21.7		13.3-20.2 (16.2)	12.7-21.7 (17.9)
pelvic and anal fins	12.5	9.1	10.9	8.1	9.2		7.7-12.5 (10.0)	7.9-9.3 (8.4)
anal and lower caudal fins	7.0	4.2	6.6	5.1	6.0		4.2-7.0 (5.3)	3.8-6.0 (4.9)
Pectoral fin:								
base length	7.8	9.5	9.4	8.5	8.9		7.8-10.3 (9.1)	8.3-9.6 (8.8)
vertical height	8.6	7.1	8.9	8.8	9.5		7.1-9.6 (8.1)	7.9-10.4 (9.2)
posterior margin	8.5	—	8.0	8.7	8.7		4.8-9.1 (7.6)	4.6-9.6 (7.4)
inner margin	4.3	—	3.2	—	3.5		3.2-4.8 (4.1)	3.5-5.0 (4.5)
1st dorsal fin:								
base length	7.3	8.1	8.3	7.1	7.3		6.7-9.3 (7.9)	6.8-8.7 (7.5)

Table 1. (Continued).

Catalogue number (HUMZ)	Holotype		Paratypes				Range (mean) for all specimens	
	109126 Male 397 mm	170770 Male 166 mm	109127 Male 349 mm	109125 Female 377 mm	109124 Female 406 mm	Male (n=9) 142-397 mm	Female (n=8) 173-441 mm	
1st dorsal fin:								
vertical height	4.5	4.8	4.6	4.6	5.4	4.5-5.5 (4.9)	4.6-6.0 (5.3)	
inner margin	—	—	—	2.2	2.4	2.9-3.5 (3.1)	2.2-3.0 (2.5)	
2nd dorsal fin:								
base length	5.0	6.4	5.6	5.4	4.7	5.0-6.7 (5.9)	4.7-6.5 (5.6)	
vertical height	2.6	3.5	2.4	2.9	2.8	2.4-3.5 (3.1)	2.8-3.7 (3.1)	
inner margin	2.5	3.0	2.0	2.5	—	2.0-3.1 (2.7)	2.5-3.5 (2.8)	
Caudal fin:								
dorsal margin	22.5	26.0	22.6	23.1	22.4	22.5-27.3 (24.7)	22.4-26.5 (24.4)	
subterminal margin	4.4	—	4.2	3.9	4.8	3.6-4.4 (4.1)	3.3-4.8 (4.1)	
terminal margin	5.5	—	5.6	5.5	5.2	5.5-5.6 (5.6)	4.8-6.4 (5.7)	
Pelvic fin:								
base length	6.8	6.6	7.0	7.5	8.5	6.6-7.7 (7.0)	7.1-9.4 (8.3)	
inner margin	4.7	3.2	3.3	3.1	3.5	2.6-5.1 (3.7)	2.4-3.8 (3.3)	
Anal fin:								
base length	7.4	9.4	7.9	7.8	7.2	7.4-9.4 (8.6)	7.2-9.9 (8.2)	
vertical height	3.5	3.7	3.2	3.5	3.7	3.2-4.2 (3.7)	3.2-4.2 (3.7)	
inner margin	2.5	3.2	2.2	2.8	2.5	2.2-3.2 (2.8)	2.2-4.0 (2.8)	
Head (at 1st gill slit):								
height	8.9	5.6	10.0	7.7	10.3	5.6-10.0 (8.2)	7.8-10.3 (9.4)	
width	14.5	13.2	15.7	14.7	14.3	12.7-15.7 (14.4)	12.6-16.5 (14.4)	
Trunk (at pectoral insertion):								
height	11.3	—	—	—	—	11.3-12.2 (11.8)	9.2-16.1 (12.7)	
width	15.2	—	—	—	—	13.7-15.2 (14.4)	12.7-17.7 (14.0)	
Interorbital space	7.8	8.1	8.1	7.4	7.7	7.2-8.3 (8.0)	7.4-8.6 (7.7)	
Internarial space	2.1	2.3	2.1	2.0	2.0	1.4-2.4 (2.0)	4.5-5.9 (5.1)	

Table 1. (Continued).

	Holotype	Paratypes				Range (mean) for all specimens	
Catalogue number (HUMZ)	109126	170770	109127	109125	109124	Male	Female
Sex	Male	Male	Male	Female	Female	(n=9)	(n=8)
TL	397 mm	166 mm	349 mm	377 mm	406 mm	142-397 mm	173-441 mm
Gill slit height:							
1st	1.6	—	1.6	1.4	1.7	1.0-1.6 (1.4)	1.2-1.8 (1.5)
5th	1.1	—	1.2	1.1	1.4	1.0-1.2 (1.1)	0.8-1.5 (1.2)
Intergill length	5.5	5.2	5.9	5.0	5.9	4.5-5.9 (5.3)	4.5-5.9 (5.1)
Eye diameter	3.5	3.1	3.8	3.3	3.3	3.1-3.8 (3.4)	2.8-3.4 (3.1)
Mouth:							
length	3.1	2.7	3.0	3.1	2.5	2.6-3.1 (2.8)	2.3-3.1 (2.6)
width	9.2	8.8	9.2	8.5	9.6	7.3-9.3 (8.7)	8.2-9.6 (9.0)
Nostril width	3.3	3.2	3.3	3.0	2.7	3.0-3.7 (3.3)	2.7-3.4 (3.1)
Anterior nasal flap:							
length	1.1	—	0.9	0.9	0.8	0.9-1.1 (1.0)	0.4-1.3 (0.9)
width	2.2	1.9	2.2	1.7	1.7	1.8-2.3 (2.1)	1.7-2.3 (2.0)
Clasper:							
outer length	6.8	1.3	6.3	—	—	1.3-6.8 (3.0)	—
inner length	11.5	4.2	10.9	—	—	4.0-11.5 (6.7)	—
Number of:							
monospondylous vertebrae	39	40	37	39	41	37-42 (39.6)	38-41 (39.3)
precaudal vertebrae	71	71	70	71	68	69-71 (70)	66-71 (68.9)
total vertebrae	117	—	110	109	109	109-117 (112)	108-116 (111.1)
intestinal spiral valve turns	8	8	8	7	8	7-8 (7.6)	7-8 (7.6)
upper teeth	64	—	63	63	68	62-64 (63)	54-68 (62.8)
lower teeth	62	—	60	63	62	60-62 (61)	62-63 (62.3)
right enlarged larval dermal denticles	—	24	—	—	—	19-24 (21)	24
left enlarged larval dermal denticles	—	23	—	—	—	19-23 (20.8)	21-24 (22.5)

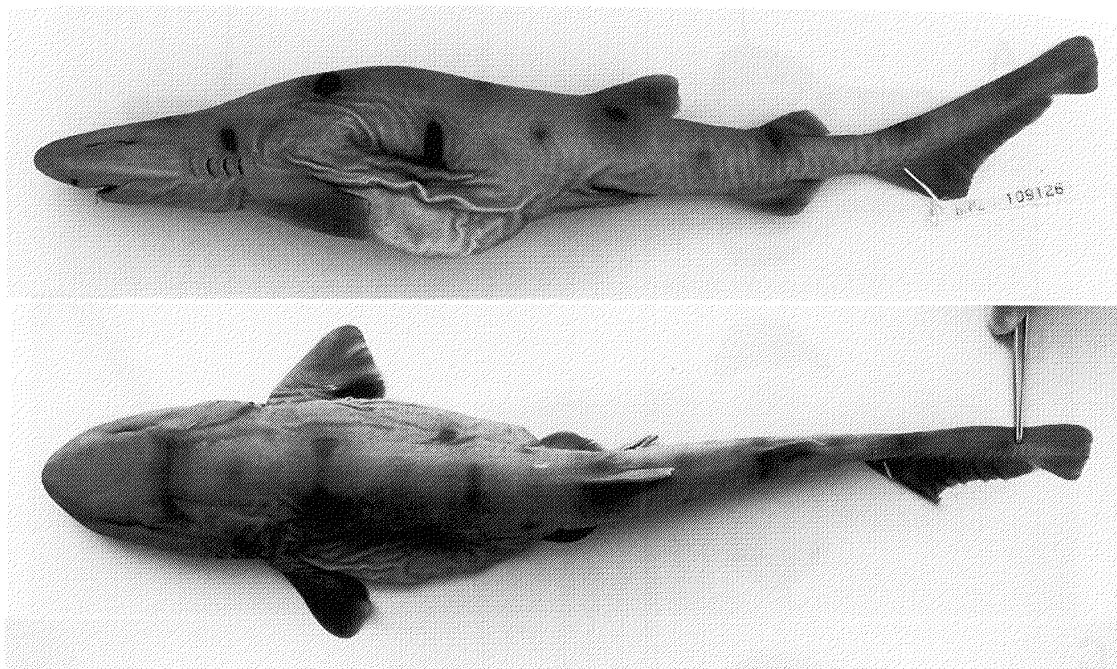


Fig. 1. Lateral (upper) and dorsal (lower) views of the holotype of *Cephaloscyllium parvum* n. sp., HUMZ 109126, 397 mm TL, male.

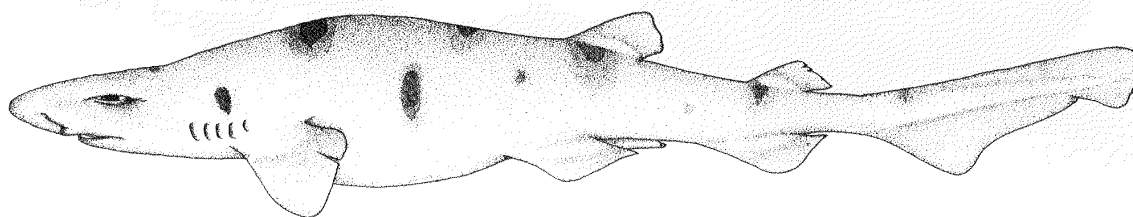


Fig. 2. Holotype of *Cephaloscyllium parvum* n. sp., HUMZ 109126, 397 mm TL, male.

smaller lateral cusps on both sides; numerous distinct ridges running from base toward each cusp; teeth near symphyses on jaws symmetrical, and lateral teeth more asymmetrical toward sides of jaws.

Dermal denticles on tip of snout rounded, thick, without cusp and ridge. Dermal denticles on lateral side of body above pectoral fin thick and leaf-like, with one cusp (infrequently one cusp with an indistinct lateral cusp) and with 3–5 strong ridges running from base toward apex of each cusp.

*Coloration* (in alcohol). Ground color light brownish on back and side of body, lighter on ventral side. Six clear, dark-brownish saddle blotches present on back of body behind eye, and at pectoral fin, middle of abdomen, first dorsal fin, second dorsal fin, and caudal fin origin; smaller and indistinct additional saddle blotches present between these dark-brownish saddle blotches and at middle of upper caudal fin. Two distinct dark-brownish blotches present above gill openings and between pectoral and pelvic fins, and additional lighter spots present above pelvic fin and between pelvic and anal fin.

*Coloration of juveniles* (based on paratype HUMZ 170770 and non-types; Fig. 3).

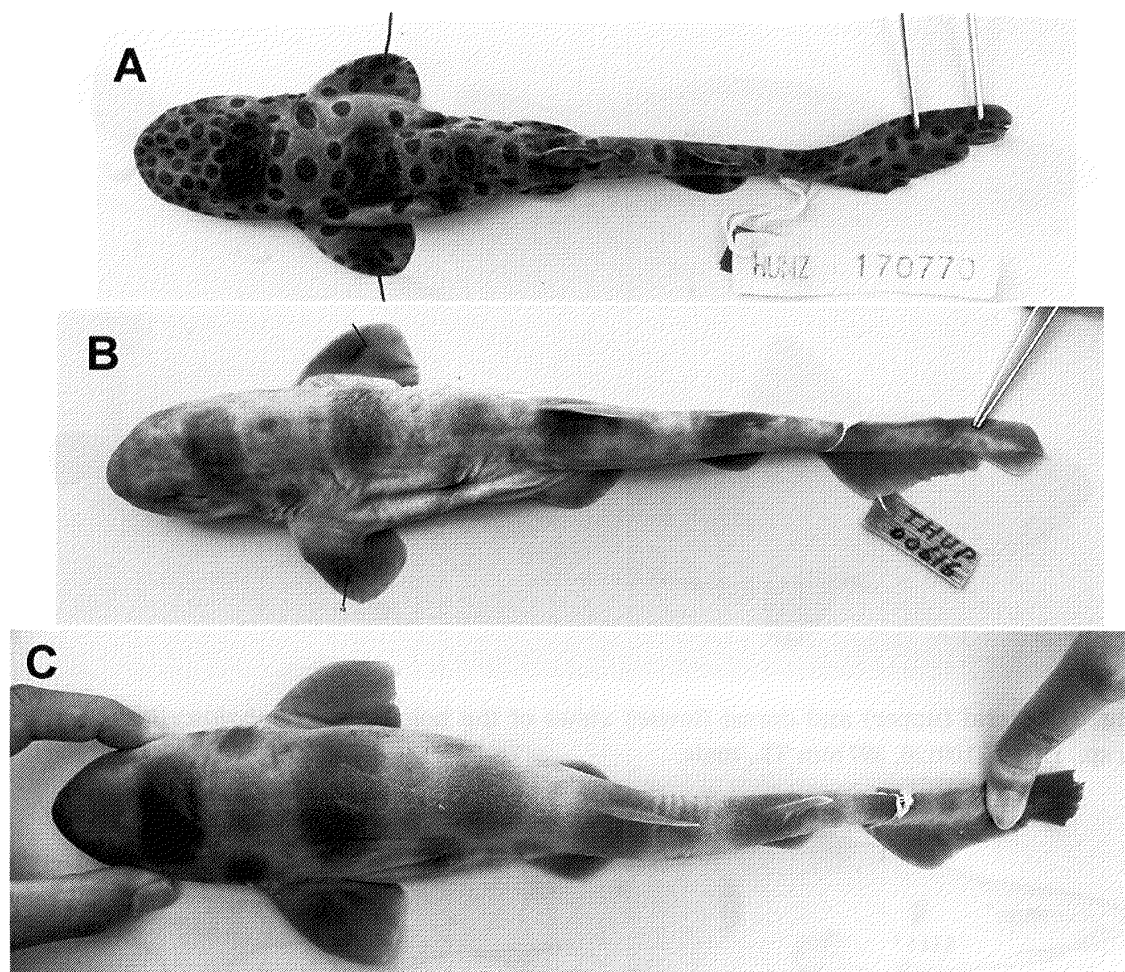


Fig. 3. Ontogenetic changes of color pattern in *Cephaloscyllium parvum* n. sp. A, Paratype, HUMZ 170770, 166 mm TL, male; B, THUP 616, 278 mm TL, female; C, THUP 1666, 334 mm TL, male.

Ground body color brownish on back and side, lighter ventrally. Numerous and distinct coffee-colored polka dots clearly present in a small specimen (Fig. 3A) all over body except on ventral side; some small spots present on ventral side of body. Polka dots lost with growth (Fig. 3B, C). Dark brown saddle blotches present behind eye, and at pectoral fin, middle of abdomen, first dorsal fin, second dorsal fin, and upper caudal fin origin.

**Sizes.** Size at maturation 334–349 mm TL in male, less than 377 mm TL in female (Fig. 4). Maximum size at least 397 mm TL in male, 441 mm TL in female.

**Distribution.** South China Sea; Kaohsiung and Tungkang (southwestern Taiwan), Hong Kong, Gulf of Tonkin (southern China), Vietnam, Borneo Island (Malaysia) (Fourmanoir and Nhu-Nhung 1965; Chan 1966; Bessednov 1969; Compagno 1988; this study) (Fig. 5).

**Etymology.** The specific name *parvum*, meaning small, refers to the dwarfed body.



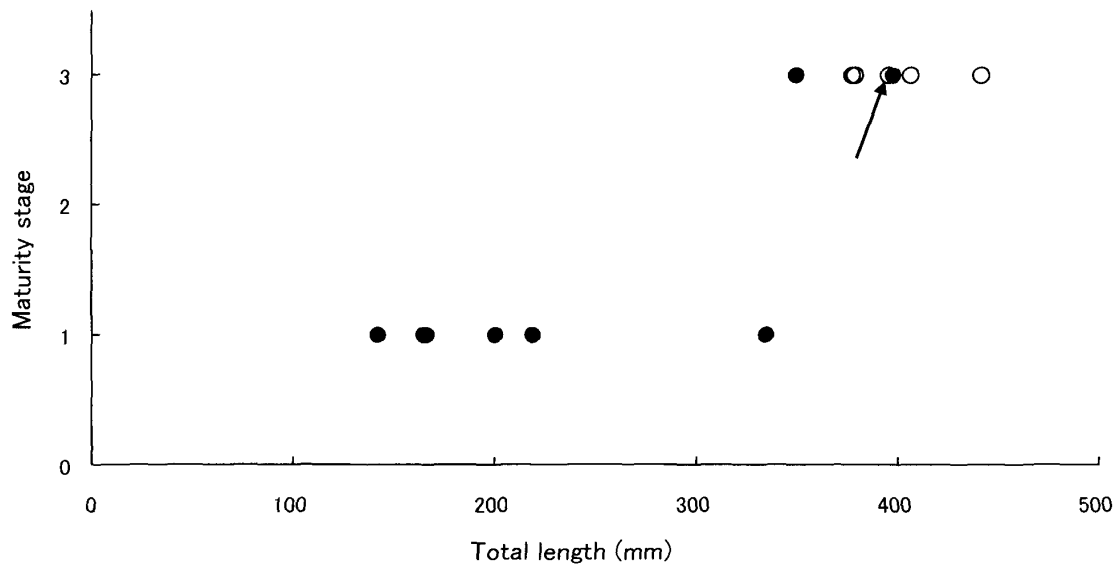


Fig. 4. Maturity stages for *Cephaloscyllium parvum* n. sp. Solid circles male; open circles female; arrow indicates holotype.

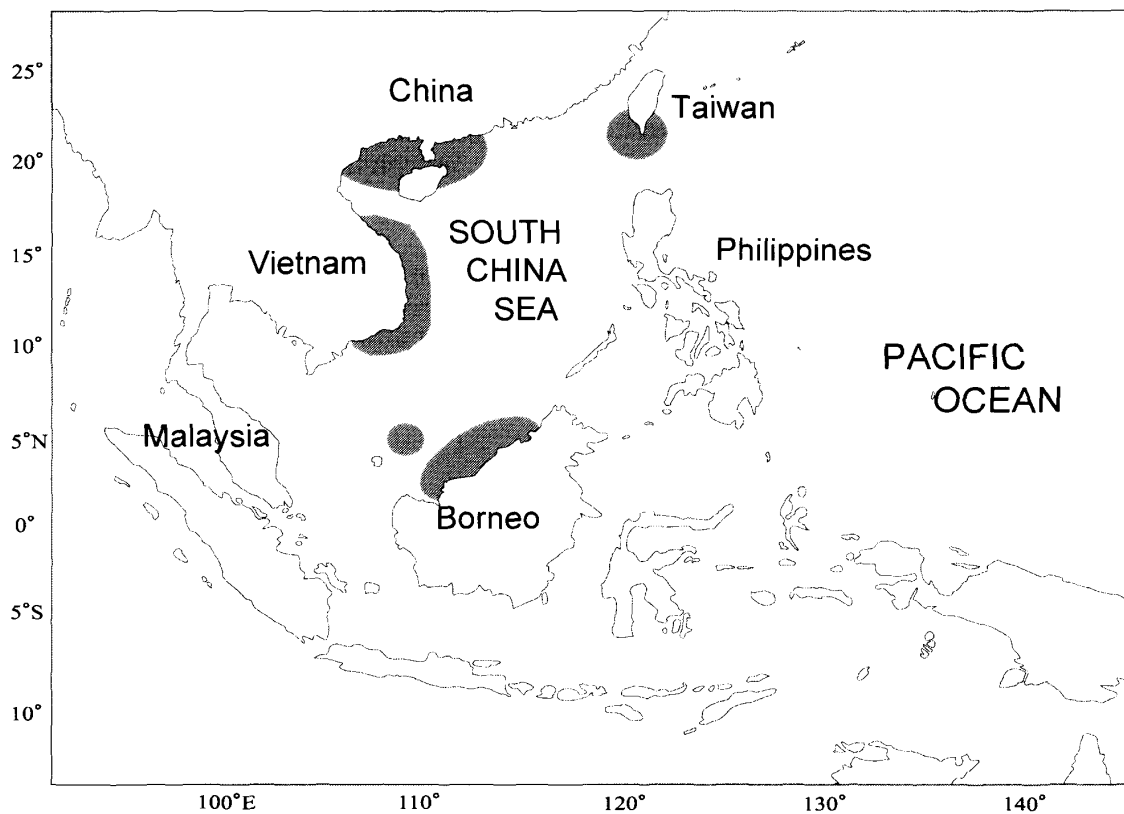


Fig. 5. Distribution of *Cephaloscyllium parvum* n. sp.

## Discussion

Seven to nine species are currently considered valid in the genus *Cephaloscyllium*, although there exist still many undescribed species in the genus. Species of this genus are separable into two groups, the large and the dwarf species (Compagno 1984, 1988). The large species, which are redefined here as those maturing at lengths of more than 500 mm TL and reaching more than 800 mm TL, include *C. isabellum* (Bonnaterre, 1788), *C. laticeps* (Dumeril, 1853), *C. ventriosum* (Garman, 1880), *C. umbratile* Jordan and Fowler, 1903, and *C. sufflans* (Regan, 1921) (Table 2). Size at maturity is unknown for *C. nascione* Whitley, 1932, but this species reaches over 80 cm TL in the male and probably grows to more than 1 m (Compagno 1984). The holotype of *Cephaloscyllium formosanum* Teng, 1962 is a fully mature female of 655 mm TL with egg cases. These facts indicate that both of the latter species are also members of the large species group.

The dwarf species, which are redefined as those maturing at lengths of less than 500 mm TL and not reaching 600 mm TL, include two species, *Cephaloscyllium fasciatum* Chan, 1966 from the South China Sea and *C. silasi* (Talwar, 1974) from India. *Cephaloscyllium fasciatum* becomes mature at lengths of 360 mm TL in males and less than 422 mm TL in females (Chan 1966; Last and Stevens 1994), and the largest adult was 422 mm TL. Likewise, *C. silasi* is already mature at 367 mm TL in males (Compagno 1988), which is also the largest size recorded for the species.

*Cephaloscyllium parvum* n. sp. becomes mature at lengths of less than 350 mm TL in males and less than 377 mm TL in females (Fig. 4), and thus is apparently not a member of the large species group. In addition to small size, it is distinguishable from the large species by a combination of other meristic/morphological characters, including the lower number of vertebrae, morphology of the egg case, and elongation of the anterior nasal flap (Table 3). Although these characters are un-

Table 2. Size at maturity and maximum size of the species of *Cephaloscyllium*.

Species	Size at maturity (mm TL)	Maximum Size (cm TL)	Source
<i>C. parvum</i> n. sp.	334–349 (male) less than 377 (female)	44	this study
<i>C. umbratile</i>	937–948 (male) 948–1011 (female)	101	this study
<i>C. formosanum</i>	less than 655 (female)	65	Teng (1962)
<i>C. laticeps</i>	820 (male)	97	Last and Stevens (1994), Compagno (1984)
<i>C. nascione</i>	?	100+	Compagno (1984)
<i>C. sufflans</i>	890 (male) 820 (female)	106	Bass <i>et al.</i> (1975), Compagno (1984)
<i>C. isabellum</i>	523–745 (male) 500–821 (female)	100+	this study, Compagno (1984)
<i>C. ventriosum</i>	more than 651 (male)	100+	Compagno (1984, 1988)
<i>C. fasciatum</i>	360 (male) less than 422 (female)	42	Last and Stevens (1994), Chan (1966)
<i>C. silasi</i>	less than 367 (male)	36	Compagno (1988)

Table 3. Comparison of distinguishing characters between *Cephaloscyllium parvum* n. sp. and "large" congeners.

Species	Number of vertebrae		Number of teeth		Number of spiral valve turns	Ridge on egg case	Anterior nasal flap reaching mouth	Source*
	Monospondylous /Precaudal	Total	Upper jaw	Lower jaw				
<i>C. parvum</i> n. sp.	37-42/66-71	108-117	54-68/60-63		7-8	absent	no	1
<i>C. umbratile</i>	47-54/80-91	—	77-110/71-102		9-12	absent	no	1
<i>C. formosanum</i>	45/79	123	68/70		—	present	no	1, 3
<i>C. laticeps</i>	43-45/76-80	—	—/—		—	present	no	5, 6, 8
<i>C. sufflans</i>	49/77-85	124-140	67-84/67-87		10	—	no	4, 7
<i>C. isabellum</i>	45-47/80-84	—	55-66/56-72		9-10	absent	no	1
<i>C. ventriosum</i>	39/70	109-112	58-69/46-85		10-11	absent	yes	2, 5, 7

\* 1, this study; 2, Garman (1880); 3, Teng (1962); 4, Bass *et al.* (1975); 5, Springer (1979); 6, Compagno (1984); 7, Compagno (1988); 8, Last and Stevens (1994). No data are available for *C. nascone*.

known for *C. nascione*, the simple body coloration with some distinct blotches in *C. parvum* (and with unique polka dots in the young; Fig. 3A) differentiates the latter from *C. nascione*.

As mentioned above, *Cephaloscyllium parvum* is a dwarf species, together with *C. fasciatum* and *C. silasi*. *Cephaloscyllium parvum* is, however, separable from these two species by the following characters. Its anterior nasal flap is triangular without a notch at its inner base, and it does not reach the mouth, while that of *C.*

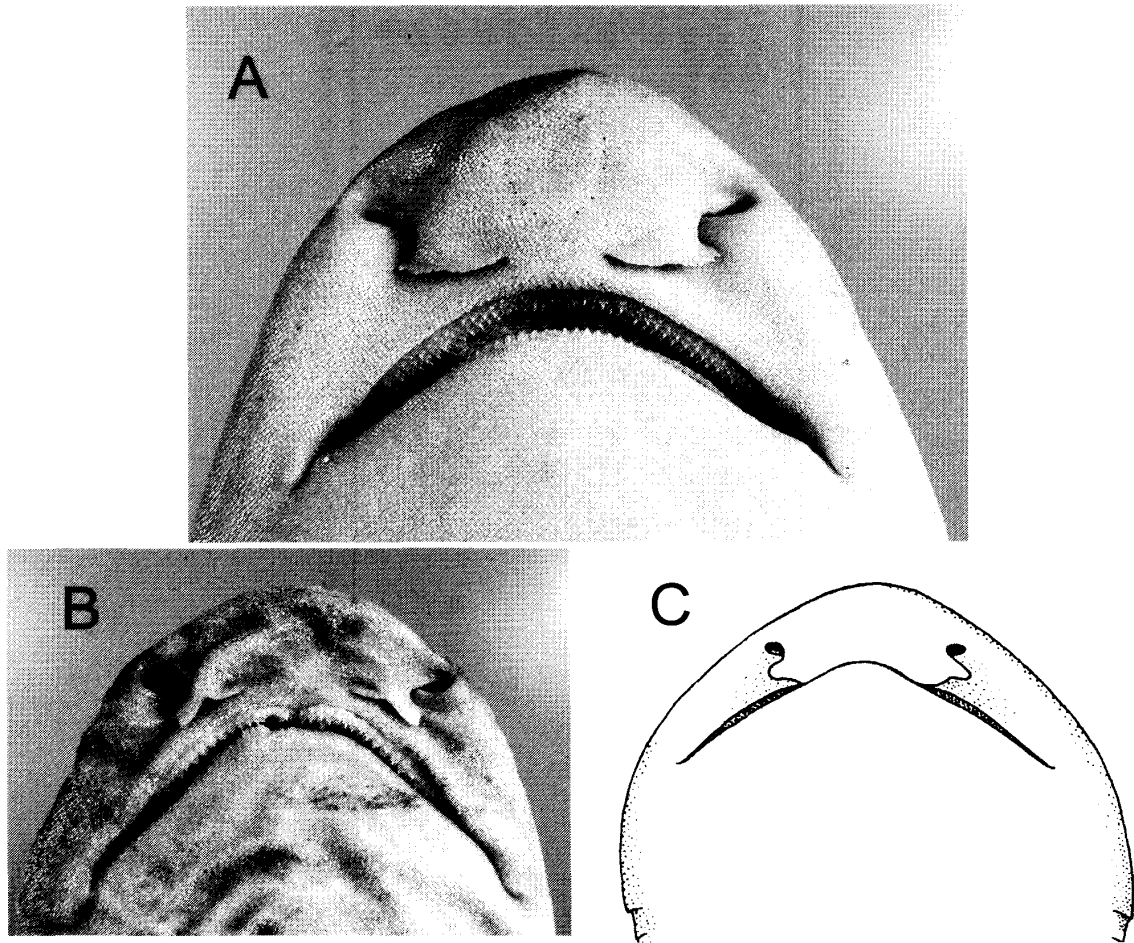


Fig. 6. Ventral views of head. A, *Cephaloscyllium parvum* n. sp., TFRI 3080, 395 mm TL, female; B, *C. fasciatum*, holotype, BMNH 1965.8.11.1, 418 mm TL, female; C, *C. silasi*, paratype, ZSI-F 6563, 368 mm TL, male (from Compagno 1984).

Table 4. Specimen frequencies in number of monospondylous vertebrae for *Cephaloscyllium parvum* n. sp. and *C. fasciatum*.

Number of vertebrae	36	37	38	39	40	41	42	43	44	45	46	47	48
<i>C. parvum</i> n. sp.		1	3	4*	6	2	1						
<i>C. fasciatum</i>										3	1	2	

\* includes holotype.

Table 5. Specimen frequencies in number of precaudal vertebrae for *Cephaloscyllium parvum* n. sp. and *C. fasciatum*.

Number of vertebrae	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
<i>C. parvum</i> n. sp.		1	1	2	4	5	3*	1										
<i>C. fasciatum</i>														1	1	3	1	

\* includes holotype.

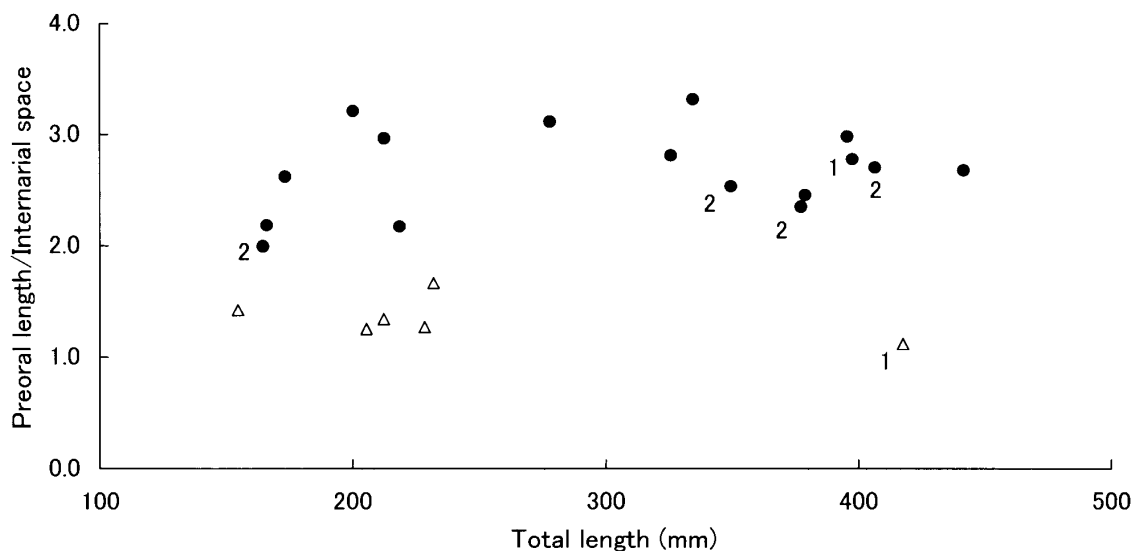


Fig. 7. Comparison of preoral length/internarial space between *Cephaloscyllium parvum* n. sp. (solid circles) and *C. fasciatum* (open triangles). 1, holotype; 2, paratype.

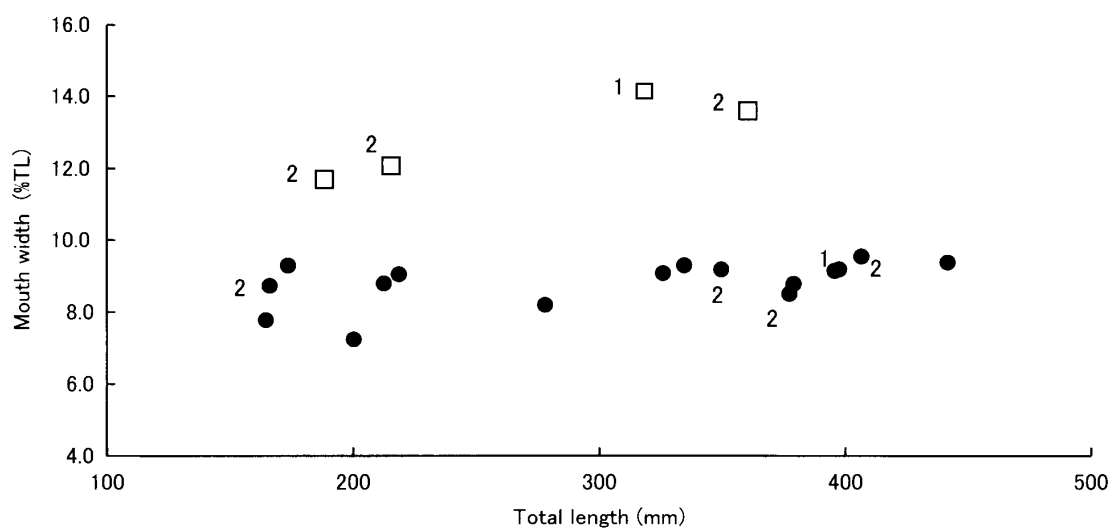


Fig. 8. Comparison of mouth width between *Cephaloscyllium parvum* n. sp. (solid circles) and *C. silasi* (open squares). Data of *C. silasi* are taken from Talwar (1974). 1, holotype; 2, paratype.

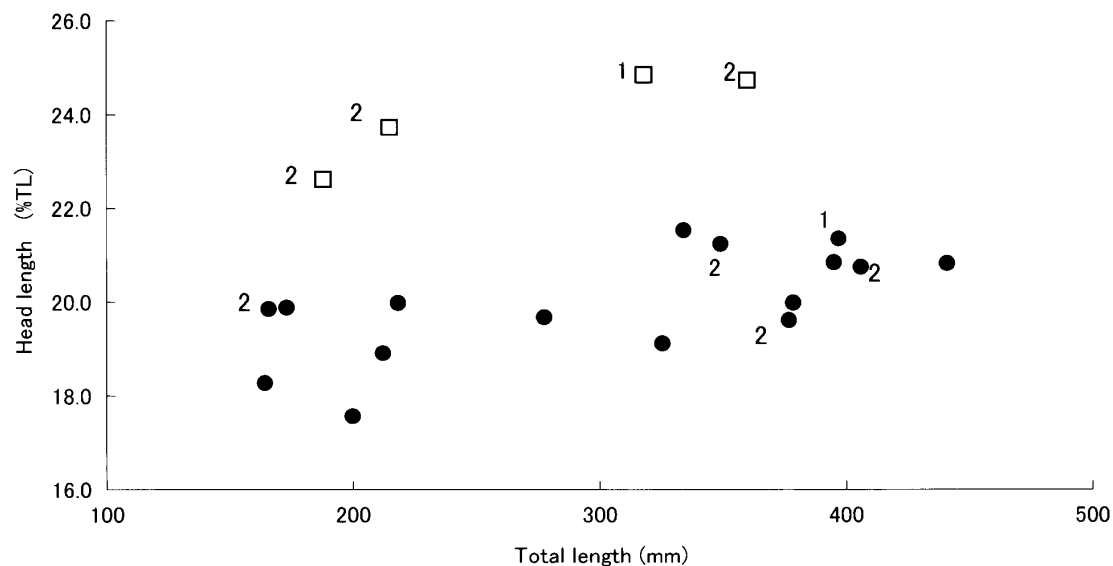


Fig. 9. Comparison of head length between *Cephaloscyllium parvum* n. sp. (solid circles) and *C. silasi* (open squares). Data of *C. silasi* are taken from Talwar (1974). 1, holotype; 2, paratype.

*fasciatum* is lobe-like with a deep notch at its inner base and that of *C. silasi* reaches the mouth (Fig. 6). The new species is also distinguishable from *C. fasciatum* by the lower numbers of monospondylous vertebrae (37–42 vs. 45–47 in *C. fasciatum*; Table 4) and precaudal vertebrae (66–72 vs. 78–81; Table 5), and the greater preoral length, which is more than twice the internarial space (vs. less than twice) (Fig. 7).

In addition, this new species is distinguishable from *Cephaloscyllium silasi* by a narrower mouth, measuring less than 10% of TL (vs. more than 10% in *C. silasi*; Fig. 8), and smaller head, less than 22% of TL (vs. more than 22%; Fig. 9).

A dwarf species that is distinct from *Cephaloscyllium fasciatum* and *C. silasi* has been reported from the South China Sea under various names: *C. umbratile* by Teng (1962), *C. sufflans* by Fourmanoir and Nhu-Nhung (1965), *C. isabellum* by Compagno (1984), and *Cephaloscyllium* sp. by Compagno (1988, 2005a, b). However, these are considered to be actually the present new species, because of the dwarf body size and simple coloration with some dark saddle and lateral blotches distributed all over the body.

### Acknowledgments

We are grateful to Drs Hung-Chia Yang (TFRI), Hin-Kiu Mok (National Sun Yat-sen University, Taiwan), Kwang-Tsao Shao (Academia Sinica, Taiwan), Shou-Jeng Joung (National Taiwan Ocean University, Taiwan), Ming-Jenn Yu (Tunghai University, Taiwan), James Maclaine (BMNH), Clive Roberts (NMNZ), Izumi Nakamura (formerly FAKU), Sho Tanaka (Tokai University, Japan), and Atsuko Yamaguchi (Nagasaki University, Japan) for collection and loan of the specimens.

## Appendix

**Comparative material.** *Cephaloscyllium umbratile* (80 specimens): HUMZ 35478, 80127, 2 males, 298–306 mm TL, off Cape Ashizuri, Kochi Prefecture, Japan; HUMZ 58698, female, 279 mm TL, off Shimoda, Kochi Pref., Japan; HUMZ 39370, 39371, 49478, 80496, 80497, 110107, 121953, 6 males, 1 female, 240–444 mm TL, Mimase fish market, Kochi Pref., Japan; HUMZ 35074, male, 266 mm TL, off Kochi Pref., Japan; HUMZ 65593, 65992, 65993, 66180, 66181, 2 males, 3 females, 236–702 mm TL, off Ishikawa Pref., Japan; HUMZ 66227, male, 237 mm TL, Hashidate Bay, Ishikawa Pref., Japan; HUMZ 50000, male, 564 mm TL, off Usujiri, Hokkaido Pref., Japan; HUMZ 39379, 39439, 2 females, 371, 377 mm TL, Kii Strait, Japan; HUMZ 117826, male, 845 mm TL, off Shirahama, Wakayama Pref., Japan; HUMZ 39434, female, 331 mm TL, off Yaku Island, Kagoshima Pref., Japan; HUMZ 95268, 95269, 1 male, 1 female, 896, 948 mm TL, 27°57.7'N, 127°59.7'E; HUMZ 138270, 138597, 1 male, 1 female, 296, 259 mm TL, off Kamo, Yamagata Pref., Japan; HUMZ 178907, 178908, 178909, 178910, 178911, 178912, 3 males, 3 females, 889–1,011 mm TL, south of Oki Island, Shimane Pref., Japan; HUMZ 170361, 170370, 170372–170376, 170384, 170471–170481, 170966–170968, 171371, 10 males, 13 females, 181–436 mm TL, Tashi Fish Market, around Kuei-shan Island, northeastern Taiwan; HUMZ 39471, 121950, 122689, 1 male, 2 females, 243–487 mm TL, Japan; TMFE 12776, 12786, 12789, 12791, 12797, 12860, 12890, 12921, 13324, 13592, 13606, 13607, 14024, 14027, 14052, 14053, 14065, 7 males, 10 females, 187–451 mm TL, off Heda, Shizuoka Pref., Japan; FAKU 58914, male, 550 mm TL, East Maizuru Fishery Harbor, Kyoto Pref., Japan; FAKU 1012, 23818, K1261, T5, 1 male, 3 females, 205–302 mm TL, off Owase, Mie Pref., Japan.

*Cephaloscyllium formosanum* (1 specimen): TFRI 4339, holotype, female, 655 mm TL, off Tungkang, southwestern Taiwan, 22°25'N, 120°25'E.

*Cephaloscyllium fasciatum* (6 specimens): BMNH 1965.8.11.1, holotype, female, 418 mm TL, east-southeast of Cape Bantangan, Vietnam, 15°55.7'N, 109°28.5'E; ASIZP 57906, female, 155 mm TL, Tungkang, Taiwan, 22°47'N, 120°43'E; ASIZP 57928, 1 male, 3 females, 212–232 mm TL, 19°85'N, 114°03'E.

*Cephaloscyllium isabellum* (12 specimens): HUMZ 65496, female, 821 mm TL, 39°50.5'S, 172°31.3'E, New Zealand; HUMZ 91476, 91477, 91478, 91479, 91480, FAKU 106997, 3 males, 3 females, 256–523 mm TL, New Zealand waters; NMNZ P. 1250, female, 831 mm TL, off Makara, Wellington Region, New Zealand; NMNZ P. 26485, male, 745 mm TL, east of Okawa Point, 44°47.3'S, 176°05.1'W, New Zealand; NMNZ P. 25789, female, 424 mm TL, southern Canterbury Bight, 44°46.95'S, 171°37.08'E, New Zealand; NMNZ P. 37083, 2 females, 359, 370 mm TL, off Waganui, New Zealand.

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